

## Two new species of *Simulium* (*Nevermannia*) from Guizhou Province, China (Diptera: Simuliidae)

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**Abstract:** Two new species of Simuliidae, *Simulium* (*Nevermannia*) *qingshuiense* sp. nov. and *S.* (*N.*) *qialaoense* sp. nov., collected from the rivulets and tributaries of Qingshui River in Leigong Mountain Nature Reserve, Guizhou Province, are described and compared with the closely related species.

**Key words:** Simuliidae; *Simulium* (*Nevermannia*); new species; China

The systematics of the *Simulium* (*Nevermannia*) of Leigong Mountain Nature Reserve has rarely been reported, and only one species was described under the name *S.* (*Eusimulium*) *leigongshanense* by Chen and Zhang<sup>[1]</sup>. This paper reports two new species, *S.* (*N.*) *qingshuiense* sp. nov. and *S.* (*N.*) *qialaoense* sp. nov.. The type specimens are deposited in the Department of Biology, Guiyang Medical College. The descriptions and illustrations of both adult and immature stages of the two new species are given.

### *Simulium* (*Nevermannia*) *qingshuiense* sp. nov. (Figs. 1~11)

**Female** General body color brown. Body length about 3.2 mm. Wing length about 2.3 mm.

**Head** Slightly narrower than thorax. Posterior surface densely covered with short yellow hairs and several long brown hairs. Frons brownish black, grey-dusted, covered with short, fine recumbent and greyish silver hairs. Frontal ratio 31:28:44. Frons-head ratio 1:4. Antenna composed of 2 + 9 segments, brownish black except scape pale yellow. Maxillary palp with 5 segments in proportion of 8:9:30:24:112, sensory vesicle elliptical about twice as long as width and about 2/3 as long as 3rd segment. Maxilla with 11 inner teeth and 15 outer ones. Mandible with 14 inner teeth and 28 outer ones. Cibarium smooth.

**Thorax** Scutum brownish black, covered with short, fine recumbent and golden yellow hairs; Scutellum brownish yellow, with recumbent golden yellow hairs and erect long black hairs; Postscutellum brownish black and bare. Pleural membrane and katepisternum greyish black and bare. Wing: Costa with spinules as well as hairs. Subcosta hairy. Radius with basal section fully haired. Base of radius with a tuft of brownish black hairs. Legs: Fore coxa yellow. Mid and hind ones brownish yellow. All trochanters brownish black except fore ones brownish yellow. All femora yellowish brown with distal 1/4 blackish brown. All tibiae blackish brown with large yellowish brown patch medially on outer surface. All tarsi blackish brown except hind basitarsus yellowish brown on large section. Fore basitarsus not dilated. Hind

basitarsus not enlarged, nearly parallel-side. Calcipala and pedisulcus well developed. Each law with a very large teeth.

**Abdomen** Basal scale pale brown, with a fringe of pale yellow hairs. Terga dark brown and covered with brown hairs. Genitalia (Fig. 1): Sternite 8 wide with about 40 short setae and several long setae laterally and on the middle 1/3. Anterior gonapophyses simple, roundly produced posteromedially, their inner margins concave, thickened and apices curving toward each other, their posterior margins somewhat transparent. Genital fork of usual Y-shaped, with slender sclerotized stem and widely expanded arms; each arm with a nearly quadrangular sub-distal expansion and with a strongly sclerotized postero-lateral margin. Spermatheca ovoid in shape, with hexagonal reticulate pattern on surface, paraproct and cercus of moderate size.

**Male** Body length about 3.4 mm, wing length about 2.5 mm.

**Head** Upper-eye consisting of 16 horizontal and 16 vertical rows of large facets on each side. Clypeus grey-dusted, with pale hairs. Antenna composed of 2 + 9 segments, 1st flagellar segment about 2.0 times as long as the following one. Maxillary palp yellow with 5 segments in proportion of 3:3:14:11:28, sensory vesicle about 0.22 times as long as 3rd segment.

**Thorax** Nearly as in female, except hind basitarsus spindle shaped sided.

**Abdomen** Nearly as in the female. Genitalia (Figs. 2~6): Coxite large, rectangular in shape, about 1.2 times as long as wide. Style large, boot-shaped, about 0.9 times as long as than coxite, with a medially directed apical margin, inner distal margin produced as a subtriangular lobe bearing a moderate apical spine. Ventral plate lamellate, with a low, hairy produced downwards; apicolateral corners broadly rounded; posterior margin and proximal margin nearly straight; basal arms strongly sclerotized, bent inwards as long as plate body. Each paramere wide and with a long parameral hook. Median sclerite slender with bifid tip.

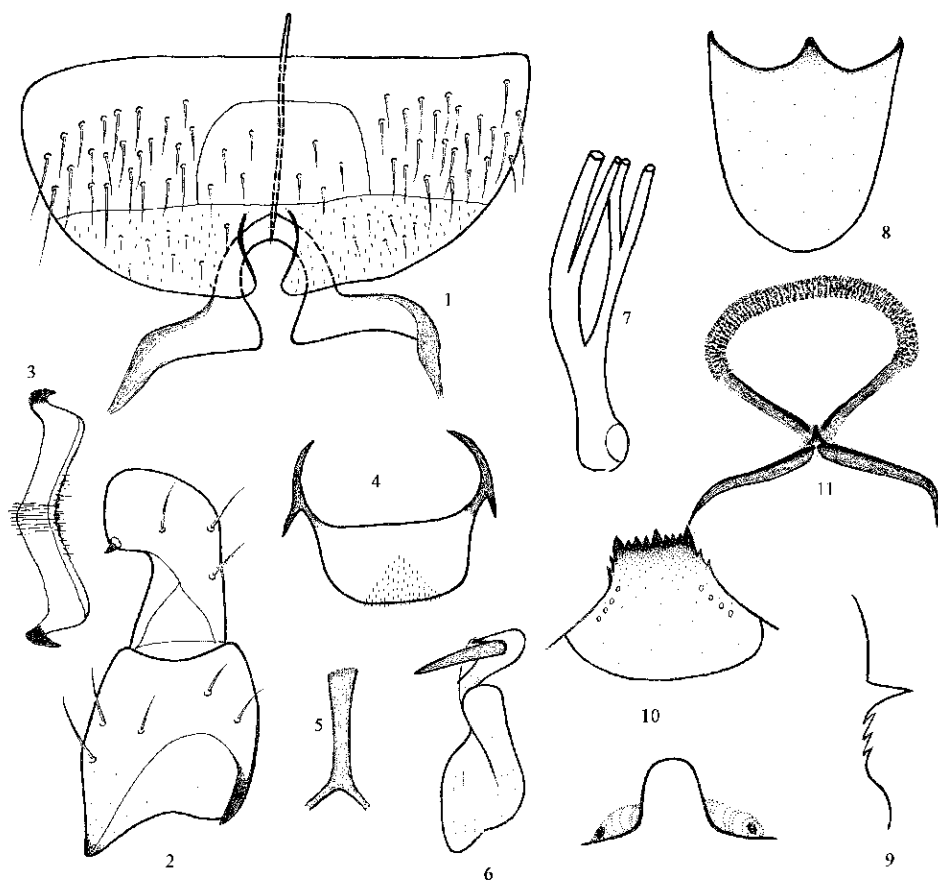
**Pupa** Body length 3.0~3.6 mm.

**Head and thorax** The integument of head and thorax brownish yellow, sparsely covered with disc-like tubercles dorso-laterally. Head trichomes 4 pairs, all long and simple. Thoracic with 6 pairs of simple, long trichomes. Gill organ (Fig. 7) with 4 filaments arranged in pairs, longer than pupal body, the basal stout stem divided into 2 stalks of variable length, usually extending in a vertical. Plane at the angle of about 30 degrees, each stalk divided again into 2 slender filaments; all filaments tapering distally, with numerous transverse ridges and covered densely with minute tubercles, dorsal most filament about 1.2 times as long as, and somewhat thicker than other 3 filaments, which are subequal to one another in length and thickness.

**Abdomen** Tergum 1 with a pair of long, short setae on each side; tergum 2 with 6 single setae on each side, 1 of them much longer than other. Terga 3 and 4 each with 4 hooked spines directed forwards along posterior margin and a pair short setae medially on each side; terga 5~8 each with spine-combs and also comb-like groups of minute spines laterated and a pair of short setae situated medially on each side; tergum 9 with comb-like of minute spines in transverse rows on each side and also a pair of developed terminal hooks. sternum 4 with a simple hair on each side; sternum 5 with a pair of bifid (or occasionally

trifid) hooks situated close together on each side. Sterna 6 and 7 each with a pair of inner bifid and outer simple (sometimes bifid) hooks widely spaced. Sterna 4 ~ 8 each with comb-like groups of minute spines directed backwards and a few short setae on each side. Cocoon (Fig. 8): slipper shaped, moderate woven, extending ventrolaterally, with strong anterior margin and moderate anterodorsal projection.

**Mature larva** Body length 6.0 ~ 6.5 mm, whole body color yellowish brown. Cephalic apotome yellow with positive head spots. Antenna composed of 4 segments in proportion of 12.5:16:11:2. Each cephalic fan with 30 ~ 32 main rays. Mandible (Fig. 9): with a few very minute supernumerary serrations; hypostomium (Fig. 10) with a row of 9 apical teeth; corner and median teeth prominent; lateral serration developed on apical 1/2; 4 hypostomial setae lying parallel to lateral margin on each side. Postgenal cleft (Fig. 10) small and rounded, subequal in length to postgenal bridge. Thoracic cuticle bare. Ab-



Figs. 1 ~ 11 *Simulium* (*Nevermannia*) *qingshuiense* sp. nov. 清水纺蚋, 新种

1. female genitalia 雌尾器腹面观; 2. coxite and style of male 生殖突基节和生殖刺突; 3. ventral plate (end view) 生殖腹板 (端面观); 4. ventral plate (ventral view) 生殖腹板 (腹面观); 5. median sclerite 中骨;  
6. parameral organ 阳基侧突; 7. pupal filaments 蛹呼吸丝; 8. cocoon 茧; 9. larval mandibular serration 幼虫上颌缘齿; 10. larval head capsules 幼虫头部 (腹面观); 11. larval anal sclerite and accessory sclerite 幼虫肛板和附加骨环

dominal cuticle bare except last segment with colorless hairs dorsolaterally. Rectal gill lobes compound, each with about 8 finger-like secondary lobules. Anal sclerite X-formed with anterior short arms about 3/4 times as long as posterior ones. Accessory sclerite marked (Fig. 11). Posterior circlelet with about 74 rows of 11 ~ 13 hooks. ventral papillae prominent.

**Type materials** Holotype ♀, reared from pupa, side-mounted, was collected in a rivulet of Qingshui River in Leigong Mountain, Guizhou Province (26°18'N, 108°17'E, 600 m), 28-IV-1985. Paratypes 4♀ ♀, 5♂ ♂, 28 pupae and 22 larvae 18 ~ 30-IV-1994, were collected in the various rivulets and several tributaries of Qingshui River from Leigong Mountain Nature Reserve. The pupae and larvae were taken from trailing grasses and leaves by CHEN Han-bin, ZHAO Hong and ZHANG Chun-lin.

**Distribution** Guizhou Province, China.

**Remarks** This new species seems to fall into the *vernum* group, as defined by Crosskey & Davies<sup>[2]</sup>. It is closely allied to *C. uchidai* (Takahasi)<sup>[3]</sup>, *C. acmeria* (Ono) from Japan<sup>[4]</sup> and *C. purii* (Datta) from India<sup>[5]</sup>. However, the new species is clearly distinguishable from latter three species by the features of the genitalia in both sexes, and by the several characters including the uppermost filament longer (1.2 times) and thicker (1.3 times) than other 3 filaments in the pupa, and the presence of marked accessory sclerite on the last abdominal segment in the larva.

*S. yushangensis* (Takaoka) from Taiwan<sup>[6]</sup> also showed some features of *S. qingshuiense* in having much longer (1.4 ~ 1.5 times) and thicker uppermost filament and marked accessory sclerite in the immature stages. It differs from the new species, however, by fact the shape of coxite and ventral plate in the male genitalia.

### *Simulium* (*Nevermannia*) *qiaolaoense* sp. nov. (Figs. 12 ~ 20)

**Female** Unknown.

**Male** Body length about 3.3 mm, wing length about 2.5 mm.

**Head** Slightly wider than thorax. Upper eye consisting of about 12 vertical and 16 horizontal rows of large facets. Face brown with sparse black hairs. Antenna yellowish brown, composed of 2 + 9 segments. 1st flagellar segment about 1.7 times of the next in length. Maxillary palp with 5 segments in proportion of 20:211:40:93. 3rd segment slightly enlarged, sensory vesicle almost globose, about 0.25 times length of 3rd segment.

**Thorax** Scutum dark brown, with recumbent golden pubescence and also sparse, black hairs on prescutellar region. Scutellum dark brown, covered with black hairs; postscutellum brownish black and bare. Pleural membrane and katapisternum bare. Wing: costa with spinules as well as hairs. Subcosta hairy. Base of rידius with a tuft of yellow hairs; basal section of rידius bare. Legs: fore coxa dark brown, mid and hind ones yellowish brown. All trochanters brownish dark. All femora dark brown on basal 1/2, becoming dark towards apex, and blackish on distal 1/3. All tibiae blackish brown with large yellowish brown patch medially on outer surface. All tarsi blackish brown except hind basitarsus pale brown. Hind basitarsus spindle shaped. Calcipala well developed about 2/5 width of basitarsal tip, extending beyond pedisulcus and up to 1/2 of 2nd hind tarsal segment. Each claw with very large basal tooth.

**Abdomen** Basal scale pale brown with a fringe of pale long hairs. Dorsal surface of abdominal segments brown black except that of 2nd segment brown, and covered with short hairs. Genitalia (Figs. 12 ~ 15): coxite nearly rectangular in shape, about as long as wide. Style large, boot-shaped, as long as coxite. Ventral plate saddle shaped, transverse, rounded posteriorly, with microsetae on ventral surface and having a ventrally produced hairy median process. Basal arms diverged from each other, strongly sclerotized, bent inwards and conerged apically. Parameres large and each with a long parameral hook. Median sclerite tie-shaped, gradually widened distally and with pointed end.

**Pupa** Body length 3.0 ~ 3.5 mm.

**Head and thorax** The integument of head and thorax yellow with sparse disclike tubercles. Gill organ (Fig. 16): almost as in *S. (N.) qingshuiense* except terga 9 absence of comb-like of minute spines in transverse rows on each side. Cocoon (Fig. 17): nearly as in *S. (N.) qingshuiense*.



Figs. 12~20 *Simulium (Nevermannia) qiaolaense* sp. nov. 桥落纺蚋, 新种  
 12. coxite and style of male 生殖突基节和生殖刺突; 13. ventral plate (ventral view) 生殖腹板  
 (腹面观); 14. median sclerite 中骨; 15. parameral organ 阳基侧突; 16. pupal filaments  
 蛹呼吸丝; 17. cocoon 茧; 18. larval mandibular serration 幼虫上颚缘齿; 19. larval  
 head capsules (ventral aspect) 幼虫头部 (腹面观); 20. larval anal sclerite and  
 accessory sclerite 幼虫肛板和附加骨环

**Mature larva** Body length 5.5 ~ 6.5 mm, whole body color yellowish.

**Head** Cephalic apotome with faint positive head spots. Antenna composed of 4 segments in proportion of 40:71:52:2. Each cephalic fan with 28 ~ 30 main rays. Mandible with 3 minute supernumerary serrations (Fig. 18). Hypostomium with a row of 9 apical teeth, corner and median teeth prominent and intermedia teeth moderate developed, lateral serration developed on apical 1/2; hypostomial setae 5 in number, divergent posteriorly from lateral margin on each side. Postgenal cleft (Fig. 19) submitre shaped, parallel-sided near base 3/4, then converging apically, about as long as postgenal bridge. Thoracic and abdominal cuticles bare. Rectal gill lobes compound, each lobe with about 8 finger-like secondary lobules. Anal sclerite of usual X-form, with broadened anterior arms much shorter than posterior ones. Accessory sclerite moderate marked (Fig. 20). Posterior circle with about 78 rows of 12 ~ 13 hooks. Ventral papillae prominent.

**Type materials** Holotype ♂, dissected from pupa, slide-mounted together with its associated pupal skin, was taken from a small stream of Qiaolao in Leigong Mountain Nature Reserve (26°18'N, 108°17'E, 1400 m), 14-IV-1994. Paratypes 2 pupae and 5 larvae, same data and place as holotype by ZHANG Chun-lin.

**Distribution** Guizhou Province, China.

**Remarks** According to the shape of male style and the characters of pupa and larva, the new species belongs to the *vernum* group as defined Crosskey & Davies<sup>[2]</sup>, but the shape of male genitalia is very characteristic, such as the ventral plate saddle-shaped and the median sclerite tie-shaped, by which the new species may be distinguished from other species in the group. However, it is noteworthy that *S. qiaolaoense* is typical for the *vernum* group and the subgenus *Nevermannia*.

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# 贵州纺蚋亚属二新种(双翅目: 蚋科)

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**摘要:** 记述了采自贵州雷公山自然保护区的纺蚋二新种, 清水纺蚋 *Simulium* (*Nevermannia*) *qingshuiense* sp. nov. 和桥落纺蚋 *S.* (*N.*) *qiaolaoense* sp. nov., 二者均以其产地命名。文中对其成虫、蛹和幼虫形态进行了全面描述, 并与其近缘种进行分类讨论。模式标本存放在贵阳医学院生物学教研室。

**关键词:** 蚋科; 蚋属; 纺蚋亚属; 新种; 中国

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